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TUBERCULOSIS IN CATTLE.

LECTURE BY

DR. FRANK S. BILLINGS, V. S.,

OF BOSTON.

READ AT THE COUNTRY MEETING OF THE MASSACHUSETTS STATE BOARD OF AGRICULTURE AT FRAMINGHAM, DECEMBER, 1885.

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TUBERCULOSIS IN CATTLE.

BY DR. FRANK S. BILLINGS, V. S., OF BOSTON.

Those diseases which we have constantly with us, and which we have come to consider inevitable evils, pass with but casual notice; but if a pest threatens us, or a locality is suddenly attacked by some disease, then the whole population is alarmed, and ready to sustain reasonable and unreasonable action.

We cringe before the small-pox or cholera, because they strike us suddenly and quickly; but neither of them, or both of them together, can, at the present day, cause the desolation created by pulmonary consumption in any term of years, — the world's death rate from this cause alone being from one-seventh to two-sevenths of all deaths.

Tuberculosis of cattle is the full and inbred sister of the disease in man; and, as will be shown, can also be considered as one cause of the disease in man

Hence, above all our animal diseases, there is, in reality, no one which should so earnestly appeal to our intelligence for preventive and restrictive legislation as this.

It is singular that it is also about the only disease of cattle that is transmissible to our own species through the food we eat. It, again, is of especial instructive value to all hygienists and legislators, and above all to breeders, in that veterinarians have collected the very strongest evidence of the value of heredity and contagium with reference to bovine tuberculosis,— evidence that is equally applicable to man.

The long continued efforts of the investigating pathologists of the world have conclusively shown that there is but one

disease that should be known as tuberculosis; that it is one and the same disease wherever found in the animal kingdom; that it is a contagious infectious disease, finding its original habitation in the human and bovine species, but is transmissible to every form of warm-blooded life; and, finally, that its cause is one peculiar specific bacillus, discovered by Robert Koch of Germany, and that this bacillus has a peculiar reaction to specific methods of coloring that is not possessed by any other bacteria that occur in the animal organism under the same conditions. Hence it will be seen that the mere presence of a small nodular body in an organ, even in great numbers, that correspond in every outward characteristic to a tubercle, by no means constitutes what we now term tuberculosis.

The other varieties are classed as "Pseudo-Tuberculosis," and occur in almost every variety of animal life. In sheep it is due to a peculiar thread worm, "Strongylus filaria," and in calves to another, — S. micrurus. In both cases the animals affected perish of what is technically termed "marasmus,"— a form of consumption; but while the chief lesions of disease are also in the lungs, we do not find any of the broken-down conditions and formation of cavities that occur in the same organ in human consumption.

Bovine tuberculosis offers us even more direct, or at least more accurately collected, evidence of the influence of heredity and contagium than has as yet been collected by medical practitioners.

It must be borne in mind that the same cause is asserted to exist in this as in human tuberculosis; hence, from this point of view, both diseases may be looked upon as a unit.

While the bovine disease has been known to veterinarians as well as to breeders for a long time, it did not attract any great attention from hygienists or investigators into the cause of disease, until it began to dawn upon their minds that tuberculosis was an infectious disease. This interest was greatly augumented when it was proven that the milk of cows having tuberculosis could cause the same disease in young animals. With the discovery of the specific bacilli in the lymph cells, and still more recently in the circulating blood, and with the positive evidence of its contagious

character, it can be safely asserted, that, aside from its importance from an economical standpoint to the cattle interests of the country, from those of public health there is no disease of our animals the importance of which bears any comparison with bovine tuberculosis, not excepting trichinæ in swine.

As the points which I desire to place emphasis upon are solely those of the relation of bovine tuberculosis to the welfare of the State from an economical and hygienic point of view, I can well be pardoned from leaving out of consideration any discussion of its symptomatology at present, particularly as most cattle men are, practically, quite well acquainted with it.

The Extension of Tuberculosis in American Cattle.

In the following remarks it must not be understood that I am entering upon a causeless polemic against our public authorities. I regret to say that we have had, and still have, a very great and dangerous evil among our cattle, which has been utterly neglected.

One of the first steps necessary to be taken is to protect the public by suitable hygienic laws, and to this end, a code of veterinary police laws and a well organized veterinary police force is one of the first necessities; then neither cattle owners nor the public have any right to blame those appointed by the Executive to represent their interests as best they can.

With neither laws, men or means at their command, suitable to the purpose, it is but natural that the best intentions can only be followed by very unsatisfactory results.

That State which first makes an intelligent move in this direction, and thus demonstrates what can be done, will confer a blessing upon the whole Union. It is to be hoped that Massachusetts will be that State, and hence be true to her reputation of always watching carefully over the welfare of her citizens.

Personally, I know nothing about the extent of tuberculosis among American cattle, yet, as already said, I venture the assertion, that the annual losses caused by it far exceed those of all other bovine diseases put together.

From the general tone of conversation among veterina-

rians and breeders, it would seem as if it prevailed more in Jerseys and other thoroughbred cattle, than in the mixed breeds; but in Germany it seems to be limited to no particular breed.

What we desire to know, and what the State should tell us, is:

1. To what extent does tuberculosis prevail in our cattle, and the exact proportion in each State?

2. Is there any evidence that climatic, telluric, geographo-topographic conditions exert the same influences on bovine tuberculosis that they do on human?

(The same is true of food, stabling, care, etc.)

3. Does any particular pure breed seem to have a natural predisposition to it, and if so, which?

4. Does grading or out-crossing tend to lessen this tendency?

5. What is its proportion between pure breeds and so-called natives?

6. What evidence have we of its extension by the cohabitation of a tuberculous animal among healthy ones in the same stable, — contagium?

7. What are the evidences which point to predisposing influences exerted by heredity?

8. Are such tendencies transmitted more by the bull than the cow, or *vice versa?*

9. What evidence can be gained from practical experiences that the milk from tuberculous cows can cause the disease in calves from healthy mothers, or young pigs, if fed upon it?

10. What amount of milk is sold in the State from diseased or tuberculous cows?

11. What is the annual loss to the cattle interests of the State from tuberculosis?

The only evidence that I can give of American origin is from a Dr. Crundall, V. S., of New York State.

In the "Journal of Comparative Medicine," vol. V., p. 330, he says: "The disease most prevalent among cattle in this district is tuberculosis. I have no hesitation in saying that fully 30 per cent. of the grade cattle in the counties of Seneca and Ontario are affected with tuberculosis. In pure-

breeds the percentage used to be even greater, but on account of the losses breeders suffered from it, the herds that used to be kept here have been broken up, so I cannot tell much about it now."

I have made every endeavor to gain information upon this point, and have written to veterinarians who knew of the loss of whole herds from this cause, and the breeders who suffered the loss, but my inquiries have been utterly ignored.

In Germany the disease has finally become a recognized evil, though no State but Bavaria has, as yet, attempted to gain any exact statistics as to its true extent among cattle.

The following statistics are, however, instructive in several ways.

The first attempt made in Bavaria was in 1877, and the percentage of tuberculosis in each thousand cattle examined was reported as 1.62. Of these, —

64	were 1 year old or under, . .	1.31 per cent.
528	were 1 year old to 3 years old, .	10.81 per cent.
1,846	were 3 years to 6 years old, .	37.80 per cent.
2,445	were over 6 years old, . .	50.07 per cent.

For the year 1877 to 1878 the percentage was 1.54 to the 1,000 head.

From Jan. 1, to Dec. 31, 1874, there were slaughtered at Augsburg, Germany, 11,311 cattle of all descriptions; of these 1.18 per cent. were tuberculous.

In 1876 there were killed, 13,241 cattle and 25,909 calves: 250 tuberculous

Of 231 oxen and 5,290 calves inspected at Munich, before the building of the city abattoirs, 235 were tuberculous.

Again, at Augsburg, 1883, there were killed, 11,829: tuberculous, 3.12 per cent.

I wish, however, to call your urgent attention to the following facts taken from the 1st Annual Report of the Municipal Abattoir at Berlin, Germany.

This institution is a model of its kind. It is under the supervision of a chief veterinary inspector, assisted by 10 chief sub-veterinary inspectors, an inspectors' recorder, and 4 branders; a supervising microscopic expert; 4 division

veterinarians; 87 sub-inspectors for trichinæ and microscopic examinations of suspicious flesh; 30 persons engaged in collecting specimens of pork from swine, to be examined for trichinæ.

The institution has fine offices, residences, etc., for the officials; a bacteriological laboratory, and one for the microscopical examinations, fitted up with every necessary appliance. The sheds and grounds are something, for neatness and substantiality, of which no American can form any conception whatever.

Whole number of animals slaughtered for the year 1884:

Cattle,	93,837
Calves,	78,220
Sheep,	171,077
Swine,	244,343

Number of butchers slaughtering at the abattoir, 567.

Not an animal can be slaughtered out of it, except horses, for which there is another and especial abattoir, where there is also the same rigid veterinary inspection.

Number of animals of which the whole carcass was condemned: —

On account of tuberculosis,	182 cattle.
" " " hog cholera,	72 swine.
" " " icterus,	38 "
" " " dropsy,	18 "
" " " general bad flesh,	9 "
" " " being poorly bled,	3 "
" " " ecchinococci,	1 "
" " " measles,	1,621 hogs.
" " " trichinæ,	216 "
" " " lime deposits in flesh,	19 "
" " " actinomycosis,	15 "

Single organs were condemned as follows: —

From cattle,	21,229
" calves,	816
" sheep,	4,806
" swine,	7,401

Tuberculosis was found in single animals, the whole carcass of which was not condemned : —

Cattle, ...	2,613 times.
Calves, ...	2 "
Swine, ...	1,313 "

One has but to consider the lessons which such an organized and circumspect inspection teaches, and to compare it with what is done in this country, in order to see how lamentably our governments are false to their public duties.

From it we should learn :

1. That we have, in reality, no meat inspection in the United States.

2. That we do not really know what diseases affect our animals, or to what extent they bear relation to the health of the consumer.

Heredity comes under what physicians call the internal causes of disease, while contagium is known as the sufficient or exciting cause.

The first is much the more important, for without it the second cannot act.

Under internal causes we include all those conditions which are brought about in the animal organism through occupation, feeding, housing or surroundings, or by disease itself, which produce organic weaknesses predisposing the individual to disease in any form.

Hereditary weaknesses are here included.

We have also what is termed a natural predisposition on the part of certain species, — such as, in the equine, for glanders ; in the canine, to rabies ; in the bovine, to rinderpest and the lung plague ; and in men, to measles, scarlet fever, etc. The real nature of such special disposing conditions is entirely beyond our knowledge.

We must bear in mind that it is not absolutely necessary that the parents themselves are actually diseased during their lifetime. They may only possess a constitutional weakness, but they may transmit it to their progeny ; and if both parents possess it, the tendency is very likely to be very much increased in the young.

With reference to tuberculosis it may be said, that everything which tends to produce an irritable condition of the respiratory tracts is to be looked upon as exerting a causal effect in producing that disease. As I shall show, the real or exciting cause of this disease is a bacillus discovered by Robert Koch in 1883, which bears his name; yet it can be asserted that where these internal weaknesses do not exist, the bacilli do not find the conditions necessary to their existence under ordinary circumstances. But this always excludes the possibility of a healthy individual becoming diseased through long continued exposure to contagium from living in the same stable with a diseased one.

The biological study of any form of disease-producing bacteria demonstrates that if the cultivating media — internal conditions — are not suitably composed chemically, if they have not the right degree of moisture, if the temperature is not conformable, the bacteria cannot live or thrive.

A vigorous and healthy pair of lungs does not offer these conditions; weak ones do, or may upon very slight invitation. In Europe, the governments forbid the use, for breeding purposes, of animals having constitutional weaknesses. American breeders are slowly learning that they must apply similar principles if they would avoid disastrous consequences. The fact that heredity plays a very important rôle in tuberculosis has long been recognized for our own species.

Louis concluded that it was an essential cause in one-tenth of all the cases he had seen; Lehert in one-sixth; and, when scrofulosis was taken into account, in three-fifths. The same is true of nearly every author that has given the subject consideration.

Johne has demonstrated, for the first time, the presence of the specific bacteria in the noduli in the lungs of a calf that was aborted at the eighth month of pregnancy.

Adam says: "That, although tuberculosis seldom develops in the fœtus, it has been sufficiently proven that a tuberculous cow can transmit the tendency to this disease to its offspring."

Busch — 1880 — demonstrated the lungs of a sucking calf

that were full of tubercles. In 1878, one such was found at Augsburg; 1880-'85, five such were found at Nürnburg.

Semmer notices five cases of pulmonary tuberculosis in the fœtus (calves). They were all aborted, — one at three months, another at six, another at eight; while the others had just been dropped. He says: "These cases prove to me that tuberculosis can develop in the fœtus during pregnancy."

Jessen found the lungs of a three months old aborted calf full of tubercles. As the tubercle bacilli have been found in the calf fœtus, and in the blood of phthisical human beings, it is now left for us to demonstrate them in the blood of the mother, and in the tissues (or blood) of the fœtus at the time the latter has been aborted.

This evidence is sufficient to show to you that the disease itself, as well as constitutional weakness, can be transmitted from parents to offspring.

We come now to consider the real or exciting cause of tuberculosis, — that is, that it is a contagious disease.

The fact that tuberculosis could be transmitted to animals by means of inoculating them with material derived from persons that have died of pulmonary consumption, is much older than the fact that the disease is contagious, — that is, can be transmitted from one living individual to another, by more or less intimate social relations, — or that it can in reality be transmitted from parents to offspring, especially by the mother during the period of pregnancy.

It is not in accordance with my present purpose to detail the historical development of the experiments by which these ideas finally gained credence, but rather to limit myself to those given by studies upon bovine tuberculosis, which are of more especial interest here. I have by no means collected all the observations that have been recorded, but rather selected a few that are very much to the point it is desired to emphasize. While considering these evidences as to the especial principle which acts as an exciting cause in constituting tuberculosis a contagious disease, you must never lose sight of the fact that the internal conditions which make infection possible are of still more importance, not only in this but all such disease.

Medicine has its fashions, and the present mode is to hunt

for bacteria alone, and to lose sight of the very lessons which this hunt teaches; viz., that the internal or preparatory conditions are far more essential to the completion of the disease than its actual or exciting cause.

The honor of being the first to prove, by direct experiment, that the fluids of the living organisms, or butter secretions, contained some unknown principle capable of inducing tuberculosis in healthy young animals, when fed upon it, belongs to a member of the veterinary profession, — Professor Gerlach, the late Director of the Veterinary School at Berlin, Prussia. If we are to judge by the value of work done to humanity in general, Gerlach was certainly the greatest veterinarian that has ever lived, for no one observation ever made by mortal man is more significant or terrible in its teachings than that the milk of cows diseased with tuberculosis can produce the same disease in young animals, when fed upon it.

Gerlach says: "Having a cow afflicted with tuberculosis, it was resolved to test the question, whether the milk from such a cow is capable of producing a similar disease in young fed upon it."

The results of these experiments upon quite a number of young animals were partially successful and in part unsuccessful, but they were sufficient to show the dangerous character of such milk as food for human beings, especially babes.

Albert reports a case of practical observation, in which a farmer's wife fed a litter of pigs with milk from a tuberculous cow that was so bad she did not dare use it. The pigs died of tuberculosis as revealed by autopsies.

Bang, however, gives the most conclusive proof of the infectiousness of the milk from tuberculous cows, and shows why such experiments have occasionally failed. In every one of his cases the tuberculous processes had extended to the udder, — tubercular inflammation of the udder, — and in every one of them he was able to demonstrate the presence of the specific bacilli in the milk, before it was fed to healthy calves from healthy parents. Every calf fed upon it died of tuberculosis.

Johne has shown that it is always possible to differentiate

between simple inflammation of the mammary gland, or garget, and the tuberculous form, by the microscopic examination of the milk after treating the same according to the prescribed methods for coloring tuberculosis bacilli.

I can confirm this testimony, having never failed in a single case, though I have not seen the cows.

Nocard — Alfort, France — found the specific bacilli in the milk of eleven cows with tubercular mammitis.

Johne reports 322 feeding experiments made with all sorts of tuberculous material. Results: 43.5 per cent. positive, 51.1 per cont. negative. These experiments were divided as follows: —

117 animals fed with tuberculous material from diseased calves: 61 per cent. positive, 34 per cent. negative.

46 animals fed with cooked meat from a tuberculous cow: 13.3 per cent. positive, 86.9 per cent. negative.

91 animals fed with milk from tuberculous cows: 30.7 per cent. positive, 59.3 per cent. negative.

1 animal fed with milk from a tuberculous rabbit: 100.0 per cent. positive.

25 animals fed with tuberculous material from man: 36.0 per cent. positive, 64.0 per cent. negative.

53 animals fed with tuberculous material from hogs: 53.0 per cent. positive, 47.0 per cent. negative.

2 animals fed with tuberculous material from rabbits: 50.0 per cent. positive, 50.0 per cent. negative.

2 animals fed with tuberculous material from monkeys: 100.0 per cent. positive.

5 animals fed with tuberculous material from hens: 100.0 per cent. positive.

Toussaint, Chouveau, Colin and others, all bear testimony that the continuous feeding of milk from a tuberculous cow to swine will cause the disease.

I have fed three hens with sputum from a man with tuberculous phthisis; one is already dead; cause, tuberculosis.

A rabbit that received two drops of the same under the skin, mixed with one hundred drops of freshly distilled water, died in six weeks, of tuberculosis.

Johne reports that a flock of ten hens, which were daily fed upon the crusts and leavings from meals of a man with

tubercular consumption, died, one after another, of tuberculosis.

Zschokki relates of a cat that constantly accompanied and slept on the bed with a consumptive old maid, that died of tuberculosis.

German veterinarians have recorded many cases of tuberculosis extending over the cattle in a stable, from one or more diseased animals being among them, a few of which I will quote.

Albrecht tells of a farm on which were kept fourteen milch cows, a bull, and four young animals. Vacancies were always filled by new animals.

The latter were under his observation for three years, during which time tuberculosis was always present. He traced its origin to two old cows that had been there the whole time. New ones were healthy when bought.

He gives another case, where nineteen animals died of tuberculosis in a period of ten years. The disease was traced to a calf that came from a tuberculous cow. It was in the stable from 1864 to 1869, but did not thrive. In 1869 it was killed and found tuberculous. In the same year the other cattle began to cough, and the disease gradually extended over all of them.

Putscher reports as follows: —

"Three large stables offered most favorable conditions for studying the question as to the extension of tuberculosis per contagium. In two of them the animals were kept for dairy purposes, as well as fattened for the market.

"In the others only steers for the latter purpose were kept. Fifty-four head were in this stable during three years. It is singular that this place should offer the most positive evidence as to the contagiousness of tuberculosis.

"In this stable were two oxen that had been purchased some eighteen months before the disease appeared. He examined them some time after purchase, and pronounced them tuberculous. As the two oxen did not fatten and become marketable, they were killed, and found to be decidedly tuberculous. As the other animals were sold, some fat, some not, every one was found to be tuberculous when slaughtered.

"New animals were bought to fill their places; their history

and condition being subjected to a rigid examination before purchase.

"They were forcedly fed and soon fattened. One was very tuberculous in all organs; five had tubercles in the lungs; nine others were somewhat affected, and but five were found free from the disease.

"In the other two stables, thirteen animals were found to be tuberculous when killed."

Ollivier reports a very instructive experience in children that were from perfectly healthy parents, but lived and slept in a room with others, at an asylum, that were consumptive. The children acquired the disease and died. This testimony is sufficient to satisfy any reasonable mind, —

1. That constitutional weaknesses may be acquired, predisposing such individuals to tuberculosis.

2. That this tendency, as well as the disease itself, can be transmitted from parents to offspring.

3. That the milk or flesh from tuberculous animals can cause tuberculosis in other animals or persons, particularly babes, when fed upon it for a length of time.

4. That tuberculosis can be transmitted to healthy animals or persons, by their continually breathing air polluted by others having the disease.

These are the facts of observation and experiment. The real contagious principle is a bacillus discovered by Robert Koch in the sputum and tissues of persons dying of consumption, and in the tissues of animals, especially cattle. He isolated these bacteria, and cultivated them, in a pure form and artificial manner, entirely independent of the animal organism.

He carried these cultivations through many succeeding generations, and then inoculated animals with them and produced tuberculosis in them. He then again cultivated them from the tissues of these animals, and again produced tuberculosis in other animals, as well as by feeding still others with diseased portions from the first.

The description of these bacteria and how to discover them is decidedly a technical question and can well be passed over here.

Prevention.

We have come now to the consideration of the most important topic in connection with all disease.

If, in the following, I may make some remarks which appear to reflect upon the honor of our State, or upon individuals, I beg you to remember that I am not combating men, but evil principles, and am but endeavoring to fulfil the purpose of my life, to be a useful citizen of our country to the fullest extent my abilities will allow. In selecting bovine tuberculosis for a subject I had two purposes in view : —

First. To show you how much more important it is, beyond any other animal disease, to you as farmers and producers.

Second. That it shows, better than any other disease can, the true demands which the public have a right to make upon the veterinary profession.

I wish first to assert: That in the light of modern science, — in the light of what some European governments are doing, — neither the government of the United States, or that of any single State in this Union, not excepting our own Massachusetts, are doing an iota to intelligently protect its people, or its vast animal interests, from disease.

Let us confine ourselves to Massachusetts. We have now, and have had, a " Cattle Commission."

What is that? A commission composed of two civilians, who, while they may know a great deal about the breeds and prices of all kinds of animals, know absolutely nothing about disease.

Then we have a Veterinarian upon it, who is only allowed five dollars a day and travelling expenses when actually employed. Gentlemen, I tell you boldly, that such pay as that, to a man of education, is a disgrace to the State which offers it, and an insult to the veterinary profession !

It may be enough for men who never received a technical education ; men who may know a little more than an ordinary butcher ; but it is not the proper remuneration for a man of ability who gives his time, or neglects his practice,

for the public good, no matter how much public spirit he may have.

The day of pole-axe commissions is over. In times of dire necessity they may be valuable to stamp out a sudden outbreak of disease; but to prevent disease, to study into its nature, even the money spent on or by such a commission, in ordinary times, is worse than wasted.

Many of the Western States are appointing State Veterinarians at a salary of $2,500 per year.

Massachusetts must do as well. Yes, gentlemen; as I shall show you that, under ordinary circumstances, a $2,500 man is not good enough. We must have a man thoroughly acquainted with disease in man as well as animals; one thoroughly acquainted with the methods of research into the causes of disease, and instructed in the methods of veterinary education all over the world, so that he may be able to tell which of them have produced the best results, and be able to show how they can be improved upon in our own country; one intimately acquainted with the veterinary police laws and organizations of the world, so that he may finally give you the best. And lastly, and above all, gentlemen, we must have a man that knows all that has been done, and is capable of exploring still deeper into the relation of animal diseases to our own health and that of our wives and children.

A "Cattle Commission" is not competent for such a work. Weigh your "Cattle Commission" here in Massachusetts or any other State; your Boards of Health in this country; your Agricultural Bureau of Animal Industry, — in the balance against these possibilities which I tell you you have a right to demand of us veterinarians, and which I assert we veterinarians can and will yet fulfil for you, as well as the best of your medical men, if you will but give us a chance.

The graduated men of your State are a united body; every honest man among them is more in earnest in being anxious to serve the State in preventing disease than in increasing his practice. If Massachusetts or the United States cannot produce the man to start this work, then go

to Germany and select the best man in their veterinary police organization.

The indications of the real work of the veterinary profession, as a part of the public service of the State, that I have given above, should show you that a "Cattle Commission" is not only a misnomer, but, as its name indicates, in no sense of the word suitable to your purposes.

While we do not want in the State a Bureau of Animal Industry, the Agricultural Department at Washington has started in the right direction by the employment of one veterinarian as the chief of its service.

Further than that the "Bureau" need not be copied. We can do better, and show them how work should be done, if you earnestly desire it.

In order to prevent disease in general, or even any given disease, it is necessary that we enter into the most minute study of every single thing that can possibly have the most remote connection with its genesis.

This purpose can be only expressed by the word research, — observational, statistical and experimental. To carry out this threefold purpose, it is necessary that some one authority, representing the accumulated intelligence of the people on the subject of public health and contagious animal diseases, should be selected by the State.

This authority should be the State Board of Health on the first part, and the State Board of Agriculture on the second. The true work of the first, or even the second, with regard to the prevention of disease in either man or animals, has scarcely dawned upon the minds of our people. Such boards are too often looked upon as honorary retreats in which to shelve useful, or useless, politicians.

The only qualification which should make any man a candidate for such a position must be fitness for the work.

Boards of health should be composed of an eminent jurist, the ablest hygienic special engineer obtainable, a competent chemist, a specialist on public health as a medical man, and the best qualified veterinarian to be obtained in matters of public health and contagious animal diseases.

The latter should be known as the State Veterinarian, and should also be connected with the State Board of Agriculture,

which should constitute all the "Commission" necessary for the control of all questions in connection with animal diseases in the State.

As their duties require an expensive and special education, those of whom the State demands all their time and energy should receive $5,000 per year.

The Governor should be chairman of each board. It is absolutely necessary that he be intimately acquainted with their workings, wants and necessities, in order that he may intelligently recommend legislation.

The legislature should be more liberal to these branches of the public service than to any other department of government.

"Public health is public wealth." "Millions for defence, but not a cent for tribute." Yet we contribute comparatively nothing to save thousands of human lives and millions of dollars in animal property from the ravages of preventable diseases.

There is not a laboratory in the United States, fitted up as it should be, and liberally supplied with funds, under the control of competent experts, where researches are being made into the nature and cause of disease, or means of prevention sought for. There is not a medical school, far less a veterinary institute, in this country, where our youths can get that technical and fundamental education through which alone they can become useful to the State in those professional duties which come under the head of State Medicine.

Yet, had we such laboratories, — and each State board of health must have one, — it is possible to discover a vaccine virus, in a pure form, that can be cultivated and dispensed in unlimited quantities, without having recourse to animals that may have the germs of tubercles in their blood; it is possible to produce a practical virus against the lung plague of cattle (which can be dispensed free of cost and be perfectly harmless), that has cost us so many millions and is likely to cost the country untold millions more; it is possible in this way to reduce the losses from hog cholera to a minimum. It has been begun in France, and we have men that can complete it here, if the State will only be true to its responsibilities to the people.

All these things are possible, and many more, of a kindred nature, probable. Scarcely a dollar is devoted to it, however. The State should be districted off into Public Health and Veterinary Police sections, — a county should form such, — each of which should have its chief medical and veterinary sanitary official, and the necessary number of sub-district officials from each profession.

All these men should be selected by the officials of the two boards mentioned, displayed competency being their only necessary qualification.

The two boards should alone constitute the examining and appointing bodies. Local authorities in cities, towns or districts, should be appointed by the respective boards and be subject to them, and not by, or to, the local governments.

All laws for these services must be especially drafted, according to the peculiar nature of each disease to be combated. They must be State, not local, laws or regulations, so that their execution may be uniform all over the State and incompetency and confliction avoided. Each local health or veterinary official should be paid for his services from the State funds. Local authorities, or communities, should hold the State boards responsible for the proper execution of these laws.

The practice of human and veterinary medicine must be so regulated by the State, that the honest graduate may be protected in the exclusive right to the use of his honorably won title, and the people given a means by which they can distinguish such men from the non-graduated man or charlatan.

The right of selection as to whom they may employ should be left free to the people. Malfeasance in practice should be regulated by the State, and the further right to practice in the State prohibited to the perpetrator thereof, whether a regular or irregular practitioner in either branch of medicine.

All diseases should be scheduled, and all practitioners — medical, veterinary and irregular — should be obliged to notify the proper local medical or veterinary official of any and every suspicious case of disease, of either an infectious

or contagious character, that was so ordained, under penalty of the law.

Statistics should be gathered, not only as to the number of deaths and their causes, but also as to the number of diseased persons, or animals diseased in any way; but especially as to everything having any causal connection therewith, even in the remotest degree.

This is especially true of infectious and contagious diseases, the least in importance of which is certainly not tuberculosis, whether in man or animals. Boards of Health and Boards of Agriculture should endeavor to educate the people in the principles of preventive medicine, as applicable to themselves or their animals, by the employment of competent lecturers from the medical and veterinary professions. The people would certainly meet them halfway in this regard. It is the duty of the State to guarantee to its people that the animal products which they use as food are free, not only from disease itself, but all disease-producing elements, as well as their water supply.

Our milk inspection is a semi-farce. If the cows are tuberculous or otherwise diseased, if they are improperly housed or fed, what a humbug it is to watch the stream from its fountain head to the consumer, and leave the spring itself — the cows — entirely out of consideration.

The State should know the exact hygienic condition of every animal in it. By this means alone can we know how much our annual losses from such causes amount to, or to what extent contagious or infectious diseases prevail. We cannot know what we must seek to prevent, until we know what exists, how it comes to pass, and how it gets spread about.

The fact that the bacilli of tuberculosis have been found in the blood indicates that they must also be in the flesh; hence, no part of such animals, or derivatives from them, should be sold for human food.

Yet thousands of them are, and hundreds of quarts of milk from diseased cows are dispensed over our cities daily, especially to the poorer classes, or ignorantly consumed by the people themselves.

We should know the exact condition of every anima

slaughtered for human food, both before and after death; we should know the condition of each organ; and, as shown by the Berlin abattoir, an exact statistic should be kept of the results of such examinations.

The State should compel the erection of public abattoirs in every city and town, and for every so many thousand inhabitants in country districts. They should never be the property of, or run in the interests of, joint-stock corporations, as at Boston. All animals destined for human consumption should be slaughtered therein, whether for the owners' use or not. These abattoirs should be under the immediate supervision of a chief veterinary inspector and the necessary number of veterinary sub-inspectors. These should be appointed by the State Board of Health but paid by the local authorities.

No animal fairs or markets should be held, unless under the supervision of a State veterinary official. This inspection should extend to the animals of all persons attending such gatherings.

I have endeavored to place fairly before you our true condition; to show you what you have a right to demand of the veterinary profession, and, above all, to indicate to you the only method by which success can be attained.

You, as citizens of the State, as the persons who have really the greatest interest in these matters, have the future in your hands.